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EXAMINER	
MOORE, IAN N	

ART UNIT	PAPER NUMBER
2661	8

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/687,009	HARPER, JOHN	
	Examiner	Art Unit	
	Ian N Moore	2661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-21 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-21 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5,6 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claim 11 objected to because of the following informalities: "the method of claim **11**..." in line 10. Since claim 11 cannot depend on itself, the examiner asserts that dependent claim 11 depends on independent claim 1.

   Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1,3,4,8-13,15,16, and 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Soloway (U.S. 5,265,092).

   Regarding Claims 1, 15, 19, and 20, Soloway'092 discloses a system (see FIG. 4, a switch 4), a computer program product (see FIG. 8 and 9, Flow chart for processing LSP packets and computing a forward table) to execute a method/code of performing route calculations in a link state routing protocol (see col. 3, line 1-8; the system utilizes LSP routing protocol) at a node (see FIG. 1, Switch 4) in a computer network of interconnected nodes (see FIG. 1, Data Packet Switching system; note that each switch in the data network performs computing/processing; thus it is a computer network.) after a change in the network's topology (see col. 3, line 1-20) and the method comprising the step of:

a processor (see FIG. 4, a combined system of Routing Logic 38 and Forwarding Process Logic 40) operable to evaluate existing routes of the node when new route information is received (see FIG. 2; col. 3, line 13-24; col. 4, line 1-59; note that when there is a change in the network, the LSP packet is received at the switch with newly affected link/route information. The routing logic, according to the LSP routing protocol, permits each switch to determine/evaluate the current/existing routes in the forwarding table), and

recalculate routes for said node only when said new route information improves existing routes or existing routes are made worse or lost (see col. 3, line 13-24 and col. 4, line 19-65; note that the LSP packet with the newly affected link/route information is received due to the network topology changes (i.e. a link is failed, a set of operational channels on the link changes, or a new switch is deployed). The routing/forwarding Logic recalculates/updates the routes in the forwarding table in accordance with the newly affected links/routes to recover/improve/advance the current/existing links routing.)

and memory (see FIG. 4, the combined system of LSP Database 34 and Forwarding Table 36) for storing route information (see col. 9, line 56 to col. 10, line 14).

Regarding Claim 3, Soloway'092 discloses receiving a link state packet (see FIG. 5, LSP packet) with information about the node's path to a root node (see FIG. 5, Originator ID, Sender, Adjacency information, in the LSP packet; see col. 10, line 57 to col. 11, line 50; note that a root node is the originator of LSP packet.) and wherein the node's route to the root node has worsened (see col. 3, line 13-24 and col. 4, line 19-65; note that the LSP packet with the newly affected link/route information is received due to the network topology

changes (i.e. a link is failed, or a set of un-operational channels on the link) and further comprising evaluating the node's path to the root node (see FIG. 2, List of forwarding channels, hold down bit channel 8a; see col. 8, line 12-60; note that the switch determines/evaluates the forwarding table by changing each potential destination node entry (i.e. hold down bit on that particular channel of the affected links/routes). Also, note that the destination node entries in the forwarding table include the neighbors' switches/nodes.)

Regarding claim 4, Soloway'092 discloses wherein nodes contained within a subtree containing the node (see FIG. 2, the intermediate switches 4 between end nodes 10; note that the forwarding table in each node/switch contains the intermediate/subtree switches (i.e. neighbor switches)) are scrapped, and the routes to all nodes in the subtree are reevaluated (see FIG. 2, List of forwarding channels, hold down bit channel 8a; see col. 8, line 12-60; note that the switch determines/re-evaluates the forwarding table by changing each destination node entry (i.e. hold down bit on that particular channel of the affected links/routes) after receiving a link change LSP due to a failure.) Moreover, in case of a link failure, the routes/links to the source/root node, stored in the forwarding table, are no longer operational; the routing/forwarding logic must re-evaluate and re-compute the existing routes in accordance with the affected links/routes. In the process of recovering/improving the routing, first the logic must cancel the links/routes associated with the affected switches. Then after, the routing logic must re-evaluate and re-compute all routes/links associated with the immediate switches/nodes in the forwarding table.

Regarding Claim 8, Soloway'092 discloses wherein the computer network comprises greater than one hundred nodes (see FIG. 1, switches 4, and see col. 23, line 50-52; note that the network includes plurality of switches; thus, it is clear that the plurality of switches can be greater than one hundred nodes).

Regarding Claim 9, Soloway'092 discloses wherein said node has lost its path to another node within the computer network (see col. 4, line 25-30 and 60-65; note that the channel failure or a permanent link failure constitutes the losing the link to another switch.)

Regarding Claim 10, Soloway'092 discloses reattaching the node at a location within a remaining portion of a spanning tree (see FIG. 2, a routing table of switch 4a consists the Hold-down bit for channel 8a of switch 4d; FIG. 9 step 74-78; col. 3, line 15-41; col. 8, line 12-61; col. 6, line 34-69; note that when LSP/ILSP indicates the affected link, the switch 4a enters the switch (i.e. switch 4d) associated with the affected links (i.e. hold-down bit entry) in the forwarding table/tree. Then, the switch (i.e. Switch 4a) re-computes/re-calculates/reattaches the switches associated with the remaining non-affected links/switches in the forwarding table. Note that a spanning tree is the forwarding table, which is build according to Dijkstra's algorithm.)

Regarding Claim 11, Soloway'092 discloses recalculating routes to all other nodes in a subtree of which the node is a root node (see FIG. 2; col. 6, line 34-69; note that when LSP/ILSP indicates the affected link, the switch (i.e. Switch 4a) re-computes/re-calculates

the links/routes associated with the switches/end-nodes the in the forwarding table. One of the switches (i.e. Switch 4d) is the origination node.)

Regarding Claim 12, Soloway'092 discloses performing an incremental route recalculation for all nodes within the network that have received new link state information (see col. 3, line 13-24 and col. 4, line 19-65; note that routing/forwarding Logic recalculates/updates the routes in the forwarding table upon receiving LSP packet. Also, see col. 7, line 60 to col. 8, line 33; and col. 20, line 31-61; note that routing and forwarding logics in each switch utilizes Dijkstra's algorithm shortest path calculation to compute/construct each route/link for the forwarding table. When applying Dijkstra's algorithm for shortest paths, the algorithm must utilize the differences/increments/deltas between existing routes and newly affected routes. Thus, each switches utilizes incremental route calculation.)

Regarding claims 13 and 18, Soloway'092 discloses a computer program product (see FIG. 8 and 9, Flow chart for processing LSP packets and computing a forward table) to execute a method/code of updating a tree structure of a root node (see FIG. 2 and 3; Forwarding Table of a switch) in a computer network of interconnected nodes (see FIG. 1, Data Packet Switching system; note that each switch in the data network performs computing/processing; thus it is a computer network.) after a change in the network's topology (see col. 3, line 1-20) and the method/code comprising the step of:

receiving new route information at the root node (see FIG. 2; col. 3, line 13-24; col. 4, line 1-59; note that when there is a change in the network, the LSP packet is received at the switch with newly affected link/route information); and

applying an incremental Dijkstra's algorithm to the root node (see col. 7, line 60 to col. 8, line 33; and see col. 20, line 31-61; note that routing and forwarding logics in each switch utilizes Dijkstra's algorithm shortest path calculation to compute/construct each route/link for the forwarding table. When applying Dijkstra's algorithm for shortest paths, the algorithm must utilize the differences/increments/deltas between existing routes and newly affected routes.) only if said new route information improves or worsens at least one of the existing routes or at least one of the existing routes is lost (see col. 3, line 13-24 and col. 4, line 19-65; note that the LSP packet with the newly affected link/route information is received due to the network topology changes (i.e. a link is failed/lost, a set of operational channels on the link changes, or a new switch is deployed). The routing/forwarding Logic recalculates/updates the routes in the forwarding table in accordance with the newly affected links/routes to recover/improve/advance the current/existing links routing.)

Regarding Claim 16, Soloway'092 discloses wherein the computer readable medium is selected from the group consisting of CD-ROM, floppy disk, flash memory, system memory, hard drive, and data signal embodied in a carrier wave (see FIG. 4, the combined system of LSP Database 34 and Forwarding Table 36; see col. 9, line 56 to col. 10, line 14; note that the combined system is the "system memory" since it is capable of storing route information.)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 2 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soloway'092 in view of Elliott (U.S. 6,456,599).

Regarding claim 2, Soloway'092 discloses receiving a link state packet (see FIG. 5, LSP packet) with information about the node's path to a root node (see FIG. 5, Originator ID, Sender, Adjacency information, in the LSP packet; see col. 10, line 57 to col. 11, line 50; note that a root node is the originator of LSP packet.) and wherein the node's route to the root node is improved (see col. 3, line 13-24 and col. 4, line 19-65; note that the LSP packet with the newly affected link/route information is received due to the network topology changes (i.e. adding a new node/switch in the network). The routing/forwarding Logic recalculates/updates the routes in the forwarding table in accordance with the newly affected links/routes to improve/advance the current/existing links routing.

Soloway'092 does not explicitly disclose wherein the node's route to the root node is improved and further comprising evaluating the node's neighbor nodes.

However, the above-mentioned claimed limitations are taught by Elliott'599. In particular, Elliott'599 teaches wherein the node's route to the root node is improved and

further comprising evaluating the node's neighbor nodes (see FIG. 5 and FIG. 9, Steps S31-S42; see col. 9, line 26 to col. 11, line 20; note that a node receives cluster beacons (i.e. link-state updates) message from the neighbors. The node determines/evaluates whether the sender node in the beacon message is already in the routing table. If the sender node is already the actual neighbor, the node stores the sender node ID into actual neighbor table (i.e. the table that stores existing routes/nodes). However, if the sender node ID in the message is not currently in the routing table (i.e. the sender node is newly added route/node), then the newly added sender node ID is added to the potential neighbor table (i.e. the table that stores newly added route/node). Then after, the actual routes and potential/new routes are compared, and the potential/new routes are added to the actual neighbor table if new/potential routes are better/improved routes than actual/current/existing routes).

In view of this, having the system of Soloway'092 and then given the teaching of Elliott'599, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Soloway'092, by providing a mechanism to optimally select improved/better actual links/routes from potential/new links/routes, as taught by Elliott'599. The motivation to combine is to obtain the advantages/benefits taught by Elliott'599 since Elliott'599 states at col. 1, line 40-64 that such modification would provide optimally selection the to actual neighbor from potential neighbor node in the routing table/list, and it would decrease the number of control traffic, reduce the cost/bandwidth in the network, and increase the network utilization.

Regarding claim 6, Soloway'092 discloses wherein the new route information improves existing routes and the new route information is used in recalculating routes (see col. 3, line 13-24 and col. 4, line 19-65; note that the LSP packet with the newly affected link/route information is received due to the network topology changes (i.e. adding a new node/switch in the network). The routing/forwarding Logic recalculates/updates the routes in the forwarding table in accordance with the newly affected links/routes to improve/advance the current/existing links routing.)

Soloway'092 does not explicitly disclose only a parent node sending the new route information is used in recalculating of improved routes.

However, the above-mentioned claimed limitations are taught by Elliott'599. In particular, Elliott'599 teaches only a parent node (see FIG. 2A, neighbor node A) sending the new route information is used in recalculating of improved routes (see col. 9, line 26 to col. 11, line 20; note that node E receives the cluster beacons (i.e. link-state updates) message from the neighbors A, B, C, and D. According to the beacon messages, node E detects that the data/packet in path node E-D-B is encountering large amount of congestions, and determines that the lesser cost and improve route from node E to node B is by incorporating neighbor node A into the route recalculation.)

In view of this, having the system of Soloway'092 and then given the teaching of Elliott'599, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Soloway'092, by providing a mechanism to incorporate the neighbor node into an improved route re-calculation upon receiving a beacon message, as taught by Elliott'599. The motivation to combine is to obtain the

advantages/benefits taught by Elliott'599 since Elliott'599 states at col. 1, line 40-64 that such modification would decrease the number of control traffic, reduce the cost/bandwidth in the network, and increase the network utilization.

4. Claims 5, 7, 14, 17, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soloway'092 in view of well-established teaching in art.

Regarding claims 5, 14, 17, and 21, Soloway'092 discloses all aspects of the claimed invention set forth in the rejection of Claims 1, 13,16, and 20, and further discloses wherein recalculating existing routes comprises implementing equal-cost path (see col. 7, line 60 to col. 8, line 33; and see col. 20, line 31-61; note that routing and forwarding logics in each switch utilizes Dijkstra's algorithm shortest path calculation when computing/re-computing or constructing/re-construing routes/links for the forwarding table. It is also note that when two shortest paths have the same cost, the rout/link is selected based upon the order of the channel address (i.e. tie-breaker).)

Soloway'092 does not explicitly disclose implementing equal-cost path splitting

However, the above-mentioned claimed limitations are taught by well-established teaching in the art of routing and Dijkstra algorithm. In particular, the tiebreaker rule is implemented for two equal-cost paths in Soloway'092 teachings. Thus, Soloway'092 must implement and assign equal cost to two or more routes/links utilizing Dijkstra algorithm. Moreover, according to Dijkstra algorithm, one can assign and implement equal cost path splitting.

In view of this, having the system of Soloway'092 and then given the well-establish teaching in the art, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Soloway'092, by providing a mechanism to assign/implement Dijkstra algorithm's equal-cost path splitting, as taught by well-establish teaching. The motivation to combine is to obtain the advantages/benefits taught by well-established teaching in the art such modification would decrease overloading one particular route/link by implementing and assigning equal cost to path/routes and by distributing/splitting the traffic load among equal cost links.

Regarding claim 7, Soloway'092 discloses all aspects of the claimed invention set forth in the rejection of Claims 1, and further discloses wherein the new route information worsens existing routes and a parent node sending the information is no longer considered a parent node by said node (see FIG. 2, List of forwarding channels, hold down bit channel 8a; see col. 8, line 12-60; note that the switch determines/re-evaluates the forwarding table by changing and excluding each destination node entry associated with the affected links/routes (i.e. hold down bit on that particular channel of the affected links/routes) after receiving a link change LSP due to a failure. Also, the patent node, a sender node, (i.e. FIG. 1, Switch 4c) sending the LSP packet due to a failure is excluded from the destination node entry in the forwarding table by hold down bits.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ian N Moore whose telephone number is 703-605-1531. The examiner can normally be reached on M-F: 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on 703-305-4798. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Ian N Moore
Examiner
Art Unit 2661

INM
1/28/04